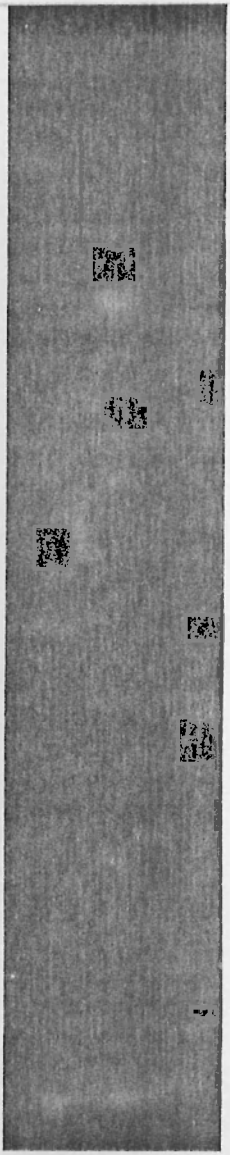

Dryland Networks Programme

ISSUES PAPER

Farmer-First: Achieving Sustainable Dryland Development in Africa

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This paper uses terms with the following meanings:

CDR: complex, diverse and risk-prone. See also the third agriculture

FF: farmer-first, referring to the new complementary paradigm of agricultural research and extension which reverses the learning and locations of TOT, with farm families playing a major part in technology development and choice

green revolution (GR) agriculture: the agriculture of fertile and well-watered areas in the South, notably the irrigated plains and deltas of Asia

industrial agriculture: the agriculture of the temperate and rich North, with high inputs and subsidies

normal professionalism: the thinking, values, methods and behaviour dominant in professions and disciplines (1)

the North: the richer, industrialised, countries mainly in the temperate northern hemisphere

paradigm: a coherent and mutually supporting pattern of concepts, values, methods and action, amenable to wide application

the South: the poorer, agricultural, countries mainly in the tropics

the third agriculture: the variously complex, diverse and risk-prone (CDR) agriculture of the South, mainly rainfed and on undulating land, found in hinterlands, mountains, hills, wetlands, and in the semi-arid, subhumid and humid tropics

TOT: transfer-of-technology, referring to the normal basic paradigm of agricultural research and extension in which priorities are decided by scientists and funding bodies, and new technology is developed on research stations and in laboratories and then handed over to extension to transfer t farmers

I. THE GREAT CHALLENGE OF THE 1990S

By the mid-1980s, agricultural production had risen sharply in the industrial agriculture of the rich North, and in the green revolution (GR) agriculture of the well-watered fertile plains of the South, but not much elsewhere, in the **complex, diverse and risk-prone** (CDR) 'third' agriculture of the South.

The great challenge for the 1990s is, then, to enable the third, CDR, agriculture to transform itself into more sustainable and productive systems, and to support many more people. To be sure, maintaining production and tackling poverty in GR areas is also vital. But the problems and solutions there are better known, although changing (2), and receive more attention. Moreover, the normal professionalism of agricultural science has served those areas better, but fits badly with the needs and priorities of the third agriculture.

II. NORMAL PROFESSIONALISM, TRANSFER-OF-TECHNOLOGY AND THE THIRD AGRICULTURE

Normal professionalism means the thinking, concepts, values and methods dominant in a profession. It is usually conservative, heavily defended, and reproduced through teaching, training, textbooks, professional rewards, and international professional meetings. Most professional mindsets change only slowly, sometimes long after the realities and priorities have changed. This is true in the social sciences as well as in the physical and biological sciences.

In agricultural research and extension, worldwide, the normal professional paradigm can be described as **"transfer-of-technology" or TOT** (3). In this model, agricultural research priorities are determined by scientists and by funding agencies; scientists then experiment in-laboratory and on-station to generate new technology; and this is then handed over to extension for transfer to farmers. There have been many modifications and variants, but the TOT model is deeply embedded in normal professional thinking and prescription. It is reflected in teaching, in behaviour in the field, and in the rhetoric of development.

The TOT model has served industrial and GR agriculture rather well. Physical and economic conditions on research stations have been similar to those of resource-rich farms and farm families. Packages have served to standardize farming systems, and have fitted in with economies of scale associated with mechanization and subsidy. The outcome has been the well-known increases in productivity per unit of land in both industrial and GR agriculture. However, the TOT model has not done well with the third agriculture. There have been limited successes, but no great production breakthroughs comparable with the green revolutions with wheat, maize and rice.

The complexity of any one CDR farming system has many aspects, and these also vary between farming systems. Five deserve mention. **First,** physically, CDR farm holdings often comprise sloping lands with a variety of conditions of soil, slope, shade, aspect and water supply, and sometimes include lands in different ecological zones on the same holding, and with

energy and nutrient linkages with common property resources (such as where livestock grazed on common grazing lands during the day are used to manure farmers' fields each night). **Second,** in their internal linkages, CDR farming systems typically involve and rely on complex interactions between crops, livestock, grasses, trees, and sometimes fish and insects. Intercropping and agroforestry in their many forms are typical of this sort of complexity. **Third,** CDR farming systems are complex temporally, with many different processes and activities at different times of the year. **Fourth,** CDR farming systems entail several or many enterprises, often off-farm as well as on-farm; many species of useful plants and animals are husbanded, and often these are multi-purpose and multi-product. **Finally,** compounding all these complexities, CDR farming systems are particularly intimately interlinked with the farm household, its labour power, social structure and economy, given the frequent absence of effective markets for many farm inputs and credit.

In addition, CDR agriculture often presents diversity of farming systems within short distances, corresponding with differences which are ecological, social and economic, for example in accessibility to markets. It is also often risky, being usually rainfed and subject to the vagaries of climate, without the stabilizing effects of reliable irrigation.

Normal agricultural science does not fit well with these characteristics. The complexity of CDR agriculture presents interactions difficult for scientists to manage and study. Some lie in the gaps between dominant disciplines (concerning agroforestry, tree fodders, crop residues, biological energy use, etc): normal science homes in on its primary concern - crops for agronomists, livestock for animal scientists, trees for foresters - rather than their linkages. Some opportunities lie in complex simultaneous innovation, where several factors must be changed at the same time, as with harvesting soils, nutrients and water, or introducing a cover crop to inhibit weed growth, or much agroforestry. For scientists tied to respectable statistical methods, these complexities can be an unmanageable nightmare: for if they simplify them until they are measureable, they destroy the complexities which are their strength.

Precisely this bad fit of CDR agriculture with normal professionalism has served to conceal its potential. When the simple packages generated in the TOT mode are not adopted in CDR areas, the conclusion can easily be drawn that the areas themselves lack potential. So they are often referred to as "resource-poor" or "low-resource" areas. But a case can be made out that their sustainable potential as a multiple of present performance, is considerable.

Any innovation, such as a new variety or new practice, is likely to fit conditions and needs of far fewer farm families in CDR areas than in GR areas which are or can be made so much more uniform. This makes work harder to justify economically, and also reduces the prestige and incentives of the work for scientists looking for the big breakthroughs. This difficulty is compounded by the presence of far fewer scientists per farming system (4). This reflects the past unpopularity of CDR agriculture, and its low status and low political priority. Understandably, irrigated green revolution agriculture has been preferred by scientists and PhD students for reasons including accessibility, ease of control, and predictability of experiments, research papers, and PhDs (5).

To gain increased attention for the problems faced by CDR agriculture and the promise of alternative research approaches requires a shift not only in the structure of incentives for scientists, but also within research and extension systems. The latter would in most cases require quite major changes in how extension staff are assessed and rewarded, and the overall ethos surrounding extension-farmer relations.

For CDR agriculture, the TOT paradigm is in crisis. At the extreme, the research priorities and locations are wrong, the messages do not fit, the packages are rejected, and the bad experience is attributed either to farmers' ignorance (prescription - more and better extension), or to farm-level constraints (prescription - identify and ease the farm-level constraints and simplify and control the farm to make it more like the research station). This approach frequently brings failure as it seeks to reduce just those elements of CDR farming systems which provide its strengths - its complexity and adaptiveness. Farmers own research methods are usually very different, and aim to experiment with new techniques and varieties on a small scale, to assess their value within the constraints imposed by local conditions.

The crisis is also one of direction. Often, CDR farmers reduce their risks by making their farming systems more complex. In terms of agroecology, this is analogous to the greater resilience in face of risk associated with complex compared with simple ecosystems. Normal TOT seeks to simplify, and thereby increases vulnerability to risk, and emphasises purchased inputs which for CDR farmers often introduce problems of reliable access. For their part, CDR farm families tend to diversify (both to increase benefits from production, to provide buffering and to spread risks) and to rely on factors of production that are under their control.

III. FARMER-FIRST: THE COMPLEMENTARY PARADIGM

The crisis has led to questioning the very processes which generate agricultural technology, and to the exploration of new approaches. Increasingly during the 1980s, innovators in the agricultural and social sciences have been working with CDR farmers to find solutions to these problems. By concentrating on what they find to work, they have evolved a new paradigm for agricultural research and extension. The approaches of this paradigm have been given various labels: farmer-back-to-farmer (6); farmer-first-and-last (3); farmer participatory research (7); Recherche-Developpement (21) and Approach Development (8). The name does not much matter, but farmer participation is one key element. For inclusiveness and brevity, we shall try to capture the essence of these approaches with the title farmer-first (FF).

The essence of FF is that it reverses some parts of the TOT process which have tended to go unquestioned. A reversal of explanation looks for reasons why farmers do not adopt new technology in deficiencies in the technology and the process which generated it, rather than in farmers' ignorance. A reversal of learning has researchers and extension workers learning from farmers. Location and roles are also reversed, with farms and farmers central instead of research stations, laboratories and scientists.

In this framework, much farming systems research can be seen as an extension of TOT: information has been obtained from farmers by outsiders, and analyzed by them to decide what would be good for the farmers, leading to

the design of experiments for testing and adaptation. In contrast, FF reverses roles. Analysis, choice and experimentation are conducted by and with farmers themselves, with outsider professionals in a facilitating and support role (22).

In Africa it has usually been the non-governmental organisations (NGOs) which have carried out the most innovative work in this field. Limited resources within national research and extension systems and the hierarchical structure of the latter have both constrained the extent to which staff have been either able or willing to maintain much contact with farmers, especially those in more distant, marginal farming areas (7).

IV. FARMER-FIRST WORK IN AFRICA

Work within Africa with FF methods is mainly confined to the experience of NGOs, who have needed to adopt a learning-process approach to their development programmes. Oxfam's agro-forestry project **in Yatenga region, Burkina Faso** is a notable example of research and experimentation by an NGO and the local community in developing manageable techniques for soil and water conservation (28). Having begun, as its name suggests, as a project aimed at tree planting activities, its direction changed greatly to focus on what farmers felt was much more important - the question of maintaining crop yields on their farmland. Simple yet effective techniques have been developed to conserve soil and water better by the use of low, rock bunds built along field contours. These bunds help slow down the flow of water across the field and thus trap water and soil within the field. Crop yields are estimated to be from 20-50% higher on treated versus untreated land, with the stabilisation of yields in years of low rainfall particularly important for farmers.

In Zimbabwe, the Zvishavane Water Resources Project, an indigenous NGO, has been involved in a process of farmer-based research, focused on developing strategies for improving the productivity and sustainable use of small natural wetland patches in this otherwise semi-arid region (27). The crucial role of these wetland patches was identified by farmers through a process of discussion about natural resource availability and use within the area. The greater level of fertility and soil moisture allow for regular cropping of these patches, with yields less vulnerable to rainfall variability. The example of one particular farmer who has developed a highly diverse way of using his wetland, with crops, trees and ponds, receives visiting farmers. These visits are then the occasion for much debate between the farmers as to the options they can pursue. It is clear from the case study that farmers often have their own ideas of what might be good development options, but they may need some support in experimenting with these.

In Senegal, ENDA has been supporting a programme of 'participative training' for students at the Institut National du Developpement Rural at Thiè, inland from Dakar (23). This programme has taken as its focus local farmers' perception that yields and the fertility of soils have been declining. Students are brought face to face with the conditions under which farmers currently operate and are introduced to an approach which emphasizes joint reflection, research, debate and experimentation. The initial workshop comprised six stages: reading the landscape; listening to farmers describe the history of their plots of land; noting down methods of fertilising soils and the results gained; sampling and analysis of soils from certain plots;

evaluation of results and comparison across the sample of villages taken; and presentation of the results to farmers and subsequent discussion. The intial workshop is seen only as a starting point for a longer process of joint research, having identified key subjects of importance. Having defined problem areas, the workshop went on to suggest measures to address these. These measures then provide the focus for longer term collaboration between the farmers and students. Good visual tools are shown to be very important in generating debate during the last stage of the workshop; several farmers comment on how looking at a photograph of their own field has enabled them to see more clearly how bare and denuded is their land.

Approaches to community development using FF techniques have been developed by the **Ethiopian Red Cross Society** for their programme in Wollo Region of Ethiopia (29). In an initial exercise in March 1988, staff carried out a survey of two villages in Wollo. This tested the applicability of RRA/FF techniques to the development work of the ERCS and sought possible innovations in the two villages studied that might bring equitable and sustainable progress for these communities. An eight-day workshop brought together staff from a number of organisations to assess the main constraints and opportunities present in each locality. Through a discussion process between workshop members and villagers, the priority needs of different villagers were identified. The investigation phase was followed by an assessment of possible 'best bets', ranging from provision of credit, to reforestation and small scale irrigation development. Each 'best bet' was then examined in terms of its likely impact on a number of criteria, such as productivity, stability of income produced, equitability, sustainability , and cost. The interventions suggested by the workshop now form part of the ERCS programme in Wollo.

In Kenya, the National Environment Secretariat has been using participatory research techniques to help develop resource management plans at village level in Machakos District (17). Bringing together researchers, local and national government officers, leaders of local women's groups and village people, workshops have been held to discuss a series of possible development options. These meetings have thrown up a large number of ideas about the priorities placed by different groups on such subjects as water, human health, tree planting and marketing. However, it was not always easy to get women to participate fully in the discussions, even when these dealt with issues of greatest interest to them. Visual materials again played a crucial role in providing a focus for discussion, particularly where different languages were being used. By bringing together local government officers from the different technical services, the workshop allowed them to discuss problems common to their separate sectors in a way which does not normally happen, due to sectoral allocation of responsibilities.

World Neighbors in Mali have been building up a network of farmer-researchers with whom they test and identify promising seed varieties (22). The programme started with diagnosis by peasant farmers of agricultural problems by focusing on debate around three main questions:

* How has farming changed since the time of your father and grandfather?

* What are the main problems you face as a farmer and what are their causes?

* How have you tried to cope with these difficulties and with what success?

These discussions throw up much information about farmers' own perceptions of change and their coping strategies. Following the discussion of options for future development, villagers are helped to visit research stations or other communities where the benefits from different options can be investigated. Farmers near Segou in central Mali were particularly concerned to find a reliable short cycle millet variety that also satisfied their criteria regarding taste and storage. Trials were set up by farmers to examine the performance of different imported seed varieties, establishing control plots next to their own fields and spanning a range of agro-ecological conditions. Following the harvest, farmers from the four participating villages were brought together to evaluate the performance of each variety and to make recommendations about appropriate techniques (such as date of sowing, soil type, etc). Following this assessment there has been a rapid and widespread diffusion of these seed varieties, entirely managed by villagers themselves.

Work in francophone West Africa using farmer-first approaches has been limited, until recently, to the methods of "recherche-développement", which place less emphasis on the direct participation of the farmer in setting the research agenda and jointly carrying out the research. On the side of extension activities, a similar approach to much FF work is presented by the techniques developed by CESAO (the Centre des Etudes Economiques et Sociales en Afrique de l'Ouest) and GRAAP (the Groupe de Recherche pour l'Appui et l'Autopromotion Paysanne), both based in Burkina Faso. These techniques encourage reflection and analysis of village-level problems by the community themselves. Since mid-1989, the International Development Research Centre (IDRC) and the Centre Regionne Africain pour le Développement (CRAT), both based in Dakar, Senegal, have been supporting a series of workshops introducing Rapid Rural Appraisal techniques to researchers and staff from a range of development projects throughout West Africa. Although the numbers trained in RRA are still small, there is a very great interest in and demand for more training workshops and their extension to incorporate members of the local Sahelian NGO community. There are still almost no materials on RRA techniques and case-studies available in french, although attempts are now being made by IDRC-Dakar and IIED-London to fill this gap.

V. FARMERS' ANALYSIS, CHOICE AND EXPERIMENTATION

FF methods are evolving fast. Many forms and variants are being tried. While not all of these are found all the time, and some can be followed without others, they are mutually reinforcing and cohere as a paradigm contrasting with and complementary to TOT. While farmer participation is a widespread and crucial element, FF goes beyond that to influence decisions and methods which may not involve farmers directly and immediately, for example concerning on-station research.

One sequence which recurs in farmer participatory activities is an iterative process of **farmers' analysis, choice, and experiment** followed by **evaluation and extension.** The main activities of farmers and roles of outsiders are:

Farmers' activities	New roles for outsiders
analysis	convenor, catalyst, adviser
choice	searcher and supplier
experiment	supporter and consultant

Let us consider the main activities in turn.

A. Analysis

Farmers' analysis can be promoted and supported in many ways:

1. Sequences of farmers' group discussions and visits (13)

2. Inspection and discussion - visiting other farmers, research stations, or trial sites (10,22).

3. Innovator workshops, where farmer innovators meet and discuss and compare their new practices (15,10)

4. The use of key priming questions by outsiders, such as "What would an ideal variety look like to you?", "What would you like your landscape to look like in the future?", "What do you farmers talk about when you get together?", "Why do other farmers have different practices to you?", and the unhurried sequence "What was farming like when you were young, how has it changed, what problems have you faced, with what have you tried to tackle them, and with what results?" (23,25).

5. Visual aids to analysis such as seasonal diagramming (16,29) aerial photographs and overlays, systems diagramming and charts representing farmers' information systematised by outsiders (17), drawn on boards or on the ground.

Methodological questions are many, and much remains to be learnt. Analysis can raise many different sorts of issues. In CDR areas, security of tenure is often a prerequisite for farmers taking a long view. Or relations with Government Departments may turn out to be crucial. It may be necessary to tackle priorities such as these before those which are more directly agricultural. Or analysis may lead straight to experimentation. Often, though, it will lead to search.

B. Search

Participatory analysis often generates demands for information and material. CDR farmers want and need wide choice and enhanced adaptability. The role of the outsider, whether researcher or extension agent, is to look for and supply a range of information about practices and potentials, and a range of genetic material. The demand is not for the package of practices for normal research and extension, but for a basket of choices.

Methodological questions refer especially to the organisation of extension and research. Extension information systems have to be stood on their head, passing requests up first, before messages down.

C. Choice

There are methodological questions about how best to elicit and support farmers' criteria and choices. This may be done, for example, by providing minikits containing several varieties of a crop, and several fertilisers, for farmers to test and choose from on their own. It is also important to keep in mind the wide range of criteria important for different members of a community: choices made by men and women, rich and poor, are likely to differ and to reflect their particular needs and constraints. One example, of group discussion, illustrates how this may be done in order to explore in some detail the characteristics of different tree species and the various uses to which each species may be put.

In a workshop in a group of villages around Khartoum, Sudan which examined incentives for tree management at individual, group and regional level, one interview was held with a group of migrants from western Sudan and another with local settled farmers. Each group was asked to name the six most important trees to them, and the names of these trees then written down on separate pieces of paper. Each group was then asked, for each pair of trees, which one they preferred and the reasons for their choice, from which a ranking of the least to the most preferred tree was derived. This procedure brought out a large amount of information about the needs which different trees satisfy, some functional (wood for building, leaves for fodder), some aesthetic (ornamental value and density of shade), and some cultural (value in funeral and marriage ceremonies). But, in particular, it showed the marked difference in criteria used and trees valued between the two groups interviewed and the consequent need to consider carefully the different groups present within a community when investigating peoples' choices (26).

D. Experimentation.

Finally, farmers themselves experiment, and adapt technology (18,19). Here what is often most important is to transfer to them not packages and precepts, but principles and methods. A famous example of the transfer of a principle is the International Potato Center's experience with diffused light storage in potatoes. Farmers themselves discovered that sprouting in storage, a problem with new varieties, was inhibited by diffused light storage. Scientists learnt from the farmers, and transferred the principle internationally. But there was no standard store to be built; farm families did not adopt a design but applied a principle, in a myriad of locally adapted different ways. An example of the transfer of a method is provided by World Neighbors, who have a simple procedure for enabling farmers to conduct their own trials more systematically (20,22).

Many methodological questions remain. One persistent problem is allowing and enabling farmers to "own" their experiments, and not to be dominated by outsiders. Enhancing farmers' capacity to experiment remains a major frontier on which much progress is needed and can be expected.

E. Evaluation and Extension

In the FF mode, evaluation is not by scientists' peers but by farmer adoption. With farmers' inspections of one anothers' fields and trials, evaluation and extension merge. Extension is not top-down, as often in the T and V mode in practice, but lateral, from farmer to farmer. NGOs in Sahelian Africa have recognised the potential benefits of farmers learning from other farmers, and several run exchange visits between project areas. These have brought, for example, Malian farmers to see soil and water conservation work in Burkina Faso, and pastoral herders fron Chad to see work in Senegal.

VI. REFLECTIONS FOR THE FUTURE

The argument for the FF paradigm to complement TOT has been developed here in terms of the third, CDR, agriculture, but its application is not necessarily so limited. FF approaches and methods, devised and evolved to meet the special challenges of CDR agriculture, may in the 1990s be found to apply more and more in GR and industrial agriculture, helping the 1990s to become a decade, worldwide, of diversification.

For the present, though, the higher priority appears to lie in CDR agriculture, evolving and testing methods, and striving for cost-effectiveness, spread and sustainability. This raises many questions, including these:

1. To what extent, and how, can the FF paradigm be parsimonious, that is, sparing in its demands on outsiders' time so that many more of the diverse farming systems can be served? How can FF approaches be given greater coherence to help spread knowledge of these techniques without stifling the vigour and variety of thinking from which such tools are being developed?

2. How can FF approaches and methods be assessed and evaluated, to identify what works, and how well it works and in what conditions?

3. How can FF pioneers in national and international agricultural research systems, and in national extension systems, be encouraged, supported and rewarded, in a sustained manner, with freedom to behave in new ways?

4. How can practitioners learn efficiently from their experience and pass it on to others?

5. How can new syllabi, textbooks and training courses be evolved to include FF experience and methods?

6. How can collaboration between the NGO, research and extension communities be encouraged, enabling them to build on their particular skills and experience?

7. Within the Sahelian context, how can FF approaches meet the challenge posed by the pastoral livestock sector, for which past development efforts have been especially unsuccessful?

8. How can the FF paradigm support and affirm the policy shift (in rhetoric, at least) of many governments in sub-Saharan Africa towards greater decision-making and control by local communities over their own resources and development plans?

9. Where communities become closely involved in diagnosis of their problems and constraints, how can this analysis be backed up effectively? There are dangers from unleashing expectations amongst a community which cannot subsequently be met.

It is too early to say what the ultimate potential of FF approaches and methods will be. It is not too early to say that finding out that potential is a priority.

The FF paradigm is still evolving and will never have a final shape, since it is organic rather than a structure. All the same, there are recurring elements which hang together and support each other. One is the resonance between enhancing the adaptability of farmers through widening their choice and knowledge, and enhancing the adaptability of outsiders - scientists, extensionists and NGO staff - through widening theirs. For farmers the choices are of practices and plants; for outsiders, of approaches and methods. For farmers, the adaptability is to uncertain climatic and economic conditions; for outsiders it is to needs, opportunities and insights as they arise. For all, decentralisation and reversals of authority to those "below" are entailed: to empower farmers to analyse, choose, experiment and evaluate; and to empower outsiders, however junior, to use their initiative and choose their methods to fit local conditions. It is important to recognise that FF methods imply a radical shift in the power relations existing between experts/or professionals, and local people. FF thus has its own style, which is decentralised and democratic, in which there is mutual respect and service between outsiders and farmers

Sources of further information:

There are now many published sources of FF experience. They include Experimental Agriculture (9) with selected papers from the workshop on Farmers and Agricultural Research: Complementary Methods, held at the Institute of Development Studies, University Administration (Research and Extension) Network of the Overseas Development Institute, London and in particular 'Farmer Participatory Research: A Review of Concepts and Practices' (7), and papers from the Workshop on Participatory Technology Development, held in April 1988 by the ILEIA, in the Netherlands.

Accessible examples of FF experience worldwide include the work of Jacqueline Ashby and her colleagues at CIAT in Colombia (10), of Roland Bunch and World Neighbors (11), of D M Maurya in India (12), the pioneering rapid rural appraisal (RRA) work of the University of Khon Kaen (14), and RRA Notes (24)

For more information on Rapid Rural Appraisal approaches contact:

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